LANSCE DIVISION TECHNOLOGY REVIEW

Klystron Development for Jefferson Laboratory

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The Spallation Neutron Source (SNS) program at the Jefferson Laboratory requires a source of 805-MHz, 1-MW radio-frequency power to develop and test the superconducting cavities and power couplers for the high-energy sections of the accelerator. Spare components from the Los Alamos Neutron Science Center (LANSCE) accelerator could be used to assemble a klystron-based amplifier system to meet this requirement. A quid pro quo was reached between the Jefferson Laboratory and LANSCE to build this new amplifier system for the Jefferson Laboratory in exchange for support in rebuilding two klystron tubes of a similar type. It is understood that the depletion of the LANSCE system spare parts will be minimal with no reduction in the number of spare klystrons and modulator tanks available in the sectors to support accelerator operations.

Klystron Amplifier

The plan for providing Jefferson Laboratory with a klystron-based amplifier system and a modulator tank was based on converting a salvaged modulator tank with a Litton 425-MHz klystron to an 805-MHz-modulator and klystron-amplifier system. The salvaged 425-MHz klystron and modulator amplifier was from the Accelerator Test Stand program, for which it was built with a LANSCE modulator design. As such, only minor modifications were required to convert this unit to a modulator for the 805-MHz amplifier system.

Because we have very few spare Varian VA-862A klystrons, the Jefferson Laboratory system will be based on one of our spare Litton L-5120 klystrons. The system will use up our spare solenoid assembly; therefore, a complete set of solenoid coils is being purchased, and a spare solenoid assembly will be constructed from these coils and available spare parts.

The initial schedule called for completion and delivery of the klystron and modulator to Jefferson Laboratory during February 2002, and the equipment will be on loan to Jefferson Laboratory for approximately one year.

Conversion of a 425-MHz-modulator and klystron-amplifier system started in July 2001. The 425-MHz klystron and modulator were moved to the Equipment Test Laboratory (ETL) where the klystron and solenoid assemblies were removed from the modulator tank. The modulator components were pulled out of the tank and examined for necessary modifications. New lids were fabricated for the tank to accommodate the 805-MHz tube socket and solenoid assembly. The modulator tank was then rebuilt with the replacement hardware and with an available Litton L-5120 klystron. Near the end of testing at Los Alamos National Laboratory, we still had concerns about unexpected and intermittent faults; therefore, a unit was sent to Jefferson Laboratory in December 2001 from our Sector H spares. Testing of the conversion klystron and modulator amplifier was completed, and it then replaced the Sector H unit sent to Jefferson Laboratory. The klystron and modulator tank installed at Jefferson Laboratory is shown in Fig. 1. The SNS program requested that Jefferson Laboratory make the test stand operational. The support electronics for the klystron, modulator, and solenoid

Fig. 1. *The SNS program requested that Jefferson Laboratory make the test stand operational. The support electronics for the klystron, modulator, and solenoid systems were assembled from the spare equipment modules of the LANSCE accelerator. The support electronics included two racks of electronic modules and all interconnecting wiring as shown in Fig. 2.*

systems were assembled from the spare equipment modules of the LANSCE accelerator. The support electronics included two racks of electronic modules and all interconnecting wiring as shown in Fig. 2. A water manifold for the klystron, modulator, and solenoid systems was also built in the ETL as shown in Fig. 3. This water manifold included the required distribution piping, water-flow gauges, flow interlocks, temperature gauges, and hose disconnects.

Fig. 2. *The 805-MHz klystron support electronics are the two racks on the left.*

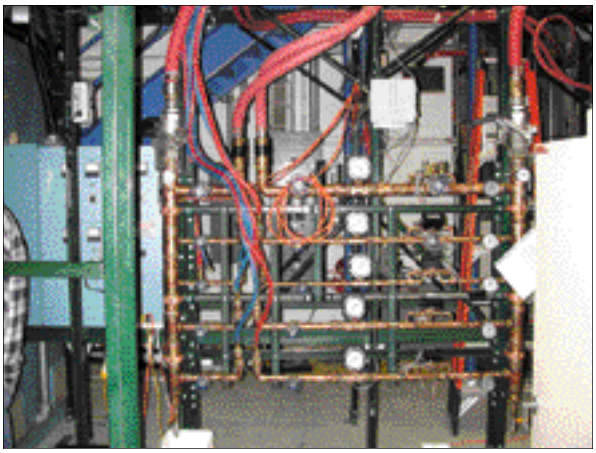

Fig. 3. *The 805-MHz klystron water manifold.*

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